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Achieving Continuity:
Reasoning and Knowing in IT Support Practices

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Abstract

This dissertation was written for examination as part of a Bachelor's Degree in the "Programme in Human Resource Development and Labour Relations" at the University of Gothenburg.

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The purpose of this study is to analyse knowing in action, that is, how people respond to challenges and disturbances in an ongoing work process of a very complex nature. The theoretical background is an interest in the relationships between people and artefacts in situated activities, and how one learns to become a competent knower. The empirical work has been carried out in the context of the work performed by an IT support unit at a major multinational company. The unit is responsible for the continuous surveillance and maintenance of a world-wide network which includes a broad range of technologies. The unit operates on a 24-hour schedule and has to respond to client queries. Data have been generated by analysing shift changes between teams working in this unit. These changes, which take place every eight hour and where the two shift-leaders interact, have been audio- and video-recorded. In addition, field notes have been taken, and the documentation produced has been collected.

The results illustrate the significance of texts and textual representations in this complex practice. The shift report produced three times a day serves as a tool for collective remembering, and as a reminder of what has to be done or kept in mind during the coming hours. It also documents problems that may be imminent. The discussions between the shift leaders, and within the staff in general, are characterised by continuous use of implicit knowledge that is hard to access for an outsider. Highly indexical expressions and categories effectively mediate complex information to those who are experienced in the problem-solving activities. This implies that the entrance as a competent member in this practice requires much more than general technical knowledge. To become a legitimate knower, the newcomer has to appropriate local distinctions and knowledge. There is also a seamless overlap between talk, texts, and technologies. Participants continuously orientate themselves to artefacts and textual representations whilst discussing problems. It is argued that knowing in this kind of activity is very much a situated affair in which generic skills relating to the understanding of technologies, of various kinds of textual representations, and of spoken discourse, are intertwined with insights into local practices that make use of such tools in a fairly unique fashion. This implies that the learning is dialectical: in order to understand local practices and instantiations of technologies and tools, some general, generic knowledge is necessary. But, such general knowledge is not sufficient for making a person a competent knower. In order to operate in the local practices, one also has to learn what the essential problems and issues are that have to be attended to. In addition, one has to learn to communicate with colleagues, clients and other groups with varying competencies. This is a very challenging task which requires considerable meta-understanding on the part of team members.

INDEX

Introduction

Modern working life is turning increasingly complex. Computer technology, that is constantly developing, is one important ingredient in this complexity. Such technology is also an element in organisational change and creates new demands on staff (Lundqvist, 2001). As new communicative tools, computers change the way we work, as well as where we work and with whom (Lundqvist, 2001; Heath & Luff, 2000). The modern office is full of different technologies that serve as means through which people deal with everyday tasks and co-ordinate activities with colleagues who are either co-located or dispersed. This kind of work requires that people learn how different tools and technologies function, but also how to use them flexibly in the practical course of co-ordinating and accomplishing tasks.

To handle such complexity, different types of competencies must be co-ordinated. Thus, companies increasingly organise their activities through teamwork, where employees dependant on each other work together. In such teams individual members do not only have responsibility for their own accomplishments, but also for what the group as a unit achieve. Teams, in this sense, have to work together towards predefined goals, which normally means that the team members have to work together, co-ordinate their actions and activities, and thus come to share the knowing that exists in the group as a whole. Despite this change in organisational activity, relatively few studies have focussed on the impact of computers and technology in everyday activities in terms of how interaction, social practices, and reasoning among the staff change (Heath & Luff, 2000). One reason for this, might be that traditionally 'knowledge' on the one hand, and, 'work', on the other, are concepts that have belonged to separate scholarly domains. Researchers interested in cognition have mainly confined their studies to educational or experimental settings, while human resource managers have had little interest in such research[1]. In this study, I argue that traditional cognitive psychology has too narrow a focus of attention to contribute to the understanding of the kind of knowing that is needed in an increasingly complex work environment. Instead, I will explore a new set of conceptualisations and arguments of human knowing that take their departure in theories of language and interaction.

The aim of the present study is to explore how we can understand and analyse 'knowing' in complex work settings. I will approach this topic through an empirical case study, and I will discuss what it may imply to become a legitimate knower in this kind of setting. The main research question is: What kind of knowing does this work setting require, and how can we theoretically and analytically conceptualise that kind of knowing?

The empirical field for studying these issues is the collaborative work of a computer support team at a major company. This case is an example of a worksite that is very complex both in the ways technology are used as well as how the interaction that is

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[1] Dialogue between the two has been almost absent until recently (Boud & Garrick, 1999; Gee, Hull, & Lankshear, 1996). This scenery is thus changing. However, even if both management theorists and cognitive theorists today talk in similar terms (about, for instance, distributed cognition and collaborative learning) there are substantial differences in cultures and the views of the world they hold.

vital to the continuation of the work unfolds. The team needs to have extensive knowledge about the usage of several computer systems as well as applications to be able to give their customers (in a global company network) the support they need. They also need to develop strategies of communication where they learn what to pay attention to in order to prevent, and successfully handle, disturbances and breakdowns.

In the following I will first examine how knowing is regarded within a traditional cognitive science perspective. I will argue that another alternative perspective can be of more relevance when looking at complex work settings, in which knowing is formed and negotiated in dialogue between people. A more specific description of what kind of knowing is required in complex work settings follows and the aim and the object of analysis. Before presenting the analysis of the data from the empirical study, the design of the study and the approach to analysis of the data will be presented. After the analysis, a discussion follows in which the main questions and findings of the study are commented upon.

Theoretical perspective

In this section knowing is regarded first from a cognitive view, and then problematized, with a focus on language. Also, some examples of studies with a focus on knowing and co-ordination in work environments will be presented. After this, the aims and object of analysis of this study are presented in more detail.

Knowledge decontextualised: information transfer and knowledge acquisition

What kind of knowing new, complex work settings require is a complicated question which is not easy to answer. Traditionally, cognitive psychologists have focussed on other contexts in their research, but the ideas are still influential in the present kind of research. However, the view of knowledge represented by cognitive traditions is difficult to use when trying to understand the new work practices. Knowledge in cognitivist approaches is for example regarded as quantitative and pre-packed, out there for individuals to acquire it as it stands. Knowledge is thus seen as something that is general and independent of its context and origin. It exists irrespective of human activities and descriptions. In the same way as houses are built by bricks, knowledge is supposed to build human knowing, and, to continue the house metaphor, in the same way that houses are completed, the human mind reaches a point of being fully developed (Säljö, 2000). This 'mechanical' view on knowledge is problematic in a changing and developing world where progress and transformations rapidly change the world, and where, consequently, it becomes important for individuals to follow in that alteration where 'new' knowledge quickly becomes 'old', and, thus, no longer useful. Rather than being static, knowing arises in interaction between people; human activity as well as the context in which it is embedded, together shape knowing (Lave, 1996).

> Knowledgeability is routinely in a state of change rather than stasis, in the medium of socially, culturally, and historically ongoing systems of activity, involving people who are related in multiple and heterogeneous ways, whose social locations, interests, reasons, and subjective possibilities are different, and who improvise struggles in situated ways with each other over the value of particular definitions of the situation, in both immediate and comprehensive terms, and for whom the production of failure is as much a part of routine collective activity as the production of average, ordinary knowledgeability (Lave, 1996, p. 17).

Psychological functions are thus not exclusively operations of a timeless mind. When carrying out an action mental functions can be said to be culturally mediated. This is so, because all actions are formed on a basis where cultural, historical, and institutional elements are intertwined. Likewise, all artefacts are culturally, historically and institutionally produced (Cole & Wertsch, 2003). In all these actions, language is, if not the only important mediating tool, one of the most important ones (Linell, 1998a), and it clearly is part and parcel of work environments.

Language at work: knowing and reasoning in situated activity

In relatively stable practices, for example workplaces, specific speech genres develop in terms of how people express themselves and organise their day-to-day routines. Speech genres are made up of utterances that not only have a certain stability in content and linguistic style but also in compositional structure (Bakhtin, 1994). Shotter and Gergen (1994) and Edwards (1997) describe communication as set up by different 'rule' systems that are specific to their respective context of use. In addition, Gergen (1985) talks about shared activity in general as constituting specific expressions and ways of talking in groups. These ways of talking and communicating reflect the specific conditions and goals the members of the unit work within (Bakhtin, 1994). What is referred to here is the inside life of teams, the interaction in play while working together with tasks. In order to relate in expected manners to both concrete subjects as well as to other members of the team (Shotter & Gergen, 1994), the members have to appropriate certain ways of evaluating situations. Bernstein (1983, from Shotter & Gergen, 1994) named this phenomenon "practical-moral knowledge". It is described by Shotter and Gergen as

> an orderly way of speaking, reading, writing, seeing, acting, reasoning, and evaluating, generally enabling those involved in the practice pretheoretically, (a) to distinguish 'units' constituting its subject matter, (b) to formulate intelligible questions about the possible relations between such units, and (c) to formulate criteria with which to judge the worth of claimed answers to these questions (1994, p. 5).

This practical-moral knowledge includes familiarity with how things are said and how terms are used within a group, recognition of the boundaries of the group, and how members are expected to perceive the outer world. It is worth noting that this understanding is "an active, cooperative enterprise of persons in relationship" namely, it is a shared activity in the group where the members have to learn both what language is used (how people talk), as well as how it is used (Gergen, 1985, p. 267). These 'rules' of communication are to a large extent optional, that is, they do not have to be used in all situations. In the end, it is individuals who decide whether to follow them or not. Not obeying them is a choice of questioning the existing rules and their relevance (Edwards, 1997). However, for the group to be maintained as a unit, and for it to successfully accomplish its tasks, it is important that the team members adapt to, and respect, the expected ways. It is thus important that the group function as a dynamic and relational unit, which is accomplished through mastery of specific social languages (Shotter & Gergen, 1994). Patterns of, for instance, using certain descriptions and explanations in favour of others are ways of sustaining the group as a unit. These communicative patterns might seem stable but current conduct and perspectives are regularly questioned and renewed, due to new inputs by interlocutors. Thus they are always socially negotiated and constructed (Gergen, 1985, see also Edwards, 1997).

Language thus helps to co-ordinate the group's actions and effectuate its tasks in forming a communal base of communication. In other words, the effectiveness of the group depends on the stability of the communication system and how well the team members appropriate the unspoken 'rules' (Shotter & Gergen, 1994). However, to accomplish tasks the team members need more than a way of communicating; they

need to share knowledge with each other. Knowledge is, rather than set, static and created in people's heads, something achieved in dialogue between people (Gergen, 1985). Knowledge is also connected to a group's history and continuity of shared activities. In long-term practices continuities of cultural traditions help build and stabilise systems of cultural knowledge. But, these are only stabilised temporarily since the systems are continually reconstructed through contestation of them (Linell, 1998a).

To summarise, I have argued that it can be more fruitful to focus on knowing rather than on a traditional view of knowledge when studying teamwork in complex settings. Knowing and understanding are not pregiven entities, but rather arise when people communicate and co-operate in joint activities.

In the following I will review some of the, rather few, empirical studies that have been conducted to explore what kind of knowing such complex work settings require, and how knowing in these studies has been theoretically conceptualised and analysed by the researchers.

The workplace as a centre of co-ordination

Suchman (1997, 1998) uses the notion of *centre of co-ordination* for describing how a shared focus of attention, interaction and activity is accomplished in highly complex work settings. "It is the centralization of such informings about ongoing events that constitutes and maintains operations as the center of coordination for work across multiple worksites and participation frameworks" (1998, p. 55). The term thus indicates reasoning as a means of maintaining a 'spatiotemporal' order as an important part of work. A centre of co-ordination is achieved by its participants and can be seen as a "complex but habitual field of equipment and action, involving intimate relations of technology and practice, body and person, place and activity" (1998, p. 36). The conditions necessary for achieving a *centre of co-ordination* are that all participants have access to it as well as to their co-workers, even when physically dispersed. Suchman characterises the workplace as a 'breathing' organ that diverges, converges and re-aligns "multiple, shifting lines of activity", which is attained by "talk, gaze, body position, gesture, space, furnishings, and equipment [which] can all be viewed as resources in its [the work's] accomplishment" (1997, p. 54).

A team often possesses a set of routines or standards as resources for accomplishing work. According to Jordan (in Suchman, 1997) such routines are maintained from within the group, rather than from the outside. Members of a team also use routines to fit unexpected contingencies into already existing patterns, as a means of categorising 'the world'. Social order is thus produced from within the group under influence of earlier activity. This is accomplished through a 'strong mutual orientation among co-present workers to each other and to developing situations' (Suchman, 1997, p. 51). One could say they are attuned to each other and each other's activities. This "attunement to the attunement of the other" (Rommetveit, 1992, p. 27) is basic for human interaction and can be understood in terms of social and moral accountability of people to interact in responsible and comprehensible manners (Semin & Manstead, 1983; Shotter, 1984).

Suchman (1997) gives two meanings to the term accountability. The term is applied to analyse the production, or reproduction, of a state of habitual everyday order. The first sense of the word is that we, as members of a social world, have to make sense of the actions of others and ourselves; we have to achieve a sort of "mutual intelligibility" (p. 49). The other definition is about us, that we as members of a society are expected to maintain specific and historically constituted orders of accountability in specific organisational settings. This "constructed shared understanding" (Hutchins & Klausen, 1998, p. 23) is an intersubjective understanding which 'appears' when a whole group possesses or has access to the same information. This communal base of similar expectations is a resource from which construction of a common understanding in a specific situation is possible. Verbal expressions are not always needed in order to accomplish communal tasks or actions. Sometimes a look or a glance towards a certain object in a particular situation tells a colleague all that is needed (see also Suchman, 1997; 1998). This implicit or already presumed knowledge is what makes the communication effective in a group or a team. It permits people to understand each other both verbally and non-verbally, even when it goes beyond the factual locutionary force of the utterance (Hutchins & Klausen, 1998).

Collaborative knowing as systems of distributed cognition

Intersubjectivity is also important for the functioning of *systems of distributed cognition* (Hutchins & Klausen, 1998). The term is used by Hutchins and Klausen as unit of analysis for describing and illuminating cognitive dimensions in complex work settings. In this case the studied setting is an airline cockpit, but it is applicable to any 'closed system' where the aim is to describe the cognitive properties of the system. The point here is to see the unit as constituted by both people and the tools in their environment as well as to illuminate the importance of information sharing in such settings to maintain continuity in work.

> The distribution of access to information is an important property of systems of distributed cognition. The properties of the larger system emerge from the interactions among the interpretations formed by the members of the crew and the contents of those interpretations are determined in part by the access to information (Hutchins & Klausen, 1998, p. 21).

In order to achieve activity productively, all personnel have to share information with others. What information is relevant and necessary to pass on is for each individual to resolve based on working knowledge. In case when actions are not in any way available to colleagues, the verbal information has to be superior to regular information (Hutchins & Klausen, 1998), since collaborative knowing otherwise would be restricted. What information that need to be transferred, and on what level of detail, also depend on the colleagues' previous knowledge; sometimes one word is enough, other times longer explanations are needed (Hutchins, 1996).

Disturbances, or restricted access, in this information sharing might result in problems with realisation of normal operations (Hutchins & Klausen, 1998). Openness to the work setting, or the material, also gives an opportunity to detect errors, which sometimes, as in airline cockpits, is of crucial importance. Faults are thus more likely to be discovered if earlier knowledge has been distributed among the members, since

the situation can be intelligibly evaluated in relation to earlier experiences. This creates dialogue and feedback that, in turn, serve to enhance the collaborative knowing. *A system of distributed cognition* is robust in terms of a system of continuance; if one individual fails, there are others to detect or correct errors. This is, as pointed out above, conditioned by all personnel having the required knowledge as well as a feeling of responsibility to maintain the system (Hutchins, 1996).

A system in which everyone knows everything is rare, partly because it is expensive (Hutchins & Klausen, 1998), but at the same time, team members rely on each other in order to satisfyingly accomplish work. The fact is that single individuals achieve less than what individuals in a co-operating team can. The skill of each individual is needed, but it only makes up a part of the full capacity of the group as a unit (Hutchins & Klausen, 1998). "The question of what parts of the process need to communicate with which other parts and how much information per unit time must be communicated is an important determinant of optimal task partitioning" (Hutchins, 1996, p. 51). The effectiveness of the group is also tied to, besides a satisfactory information sharing, the relations between members and the opportunities for learning in the environment (Suchman, 1997).

Knowing 'from within' a practice

Heath and Luff (2000) have conducted some studies "directed towards explicating the resources on which organisational personnel rely to make technologies work in the production and co-ordination of the activities for which they are employed" (p. 19).

One thing the authors find is that in almost all their studies, the accomplishment of tasks is dependent on, and co-ordinated with, the actions and activities of other individuals, even when the responsibility for tasks is clearly separated between the personnel. Individuals are said to have an ability to monitor activities in the room that are outside the direct focus of the eye. This awareness of the other's activities "is not an ability, but a socially organised and contingent achievement" (p. 90, see also Boden, 1995). Indirectness also has been found to constitute a salient feature in other respects. In a study of a London Underground control room (Heath & Luff, 2000), the staff was working on individual tasks but their activities clearly had an effect on the others' actions at the same time. Through saying things out loud, without aiming the information at a certain individual, actions could be tracked to be consequences of the communicative gesture (see also Heath & Nicholls, 1997). Saying things out loud has the function of keeping colleagues updated about events or progress in work, while simultaneously it has the effect of implicitly 'demanding' actions of colleagues, actions necessary to co-ordinate activities in a complex workplace (see also Resnick et al., 1997). Thus, the "routine organisation of particular activities, the sequential relationships between the contributions of control room personnel, and the ability mutually to monitor each other's orientation towards particular sources of information, provide the foundation to the design" and the "ability to render it intelligible and deal with the emerging crisis" (Heath & Luff, 2000, p. 115). That is, due to awareness and sensibility of participants that their activities are interrelated, they manage to deal with situations.

By saying things out loud or by just starting to suggest something, the others pick up the relevance of what is meant and continue to follow up the initiative. This tacit or

indirect reasoning is, thus, a resource through which the personnel maintain the continuity of their services. The personnel depend on both tacit, as well as explicit, practices and reasoning in order to produce, make sense of, and co-ordinate their activities with each other. These aspects of reasoning, however, are difficult to teach others explicitly. Trainee staff in the control room only get a certain degree of guidance in the work, the rest has to be learned within the situation (see also Hutchins, 1996), the easier part being the rules and regulations, and the difficult part learning how to deal with and relate to tasks that are "systematically co-ordinated in real-time with the actions and activities of colleagues" (Heath & Luff, 2000, p. 117).

Tools and technologies in modern work environments

In all the above situations, tools and technologies, alongside language as already discussed, are part of the working scene. They are the means through which the personnel work and communicate or relate to in order to gain sufficient information for work achievement. The ways in which they are used are dispersed as well as complicated. The success of identifying and managing problems with the help of technology depends "upon the routine ways in which personnel produce and co-ordinate their actions with each other" (Heath & Luff, 2000, p. 119). It is also dependent on how things are perceived by the personnel. An image or a phrase has one specific meaning for one person, whereas to another it might appear as something else. What is seen as relevant depends on what information the individual is looking for in that specific image. The technologies in themselves, and the organisation around them, thus give an incomplete view of the situation; it is human acts interrelated with the technology that make the technology intelligible and relevant (Goodwin & Goodwin, 1998). In certain areas, the tools are constructed in a way that present them as a medium for remembering events, which is, quite naturally, a more durable medium than speech and less vulnerable to mix-ups or other interruptions in the minds of individuals (Hutchins & Klausen, 1998). Tools and technologies are part of the modern complex work situations. How they facilitate or interfere with activities is an empirical question, but it is clear that they have an impact on everyday work and that they, to a certain degree, outline the frame for work co-ordination and production.

Aim and object of analysis

Instead of viewing knowledge as something static and absolute, knowing, in this perspective, is conceptualised in terms of *knowing-how-to-go-on-in-a-situated-activity* (Wittgenstein, 1980, § 875; Wittgenstein, 1981, § 446). *Knowing how to go on* implies being able to use mediating tools, including language, within *in situ* activities in an appropriate manner – not 'appropriate' in terms of what is 'true' in some general sense, but rather in terms of what is *meaningful and makes situated sense* to others when engaged in a social activity. This also implies that knowing includes the competence to bridge gaps between action and expectation when they appear in interaction with others.

Through an empirical case study, the aim of the present study is to explore how this 'knowing' can be understood and analysed in complex work settings, and also to discuss what it may mean to become a legitimate knower in that kind of setting.

The object of analysis in this kind of analytical framework is: *social actors interacting with mediational means (physical as well as discursive).* This object of analysis demands data produced through observation and recordings of the interaction of a team working in an actual work setting. The data must enable analyses of the use of both discursive and physical tools in situated activities.

In the following section, I will describe the design of the empirical study as well as how data have been generated and analysed.

Design of the empirical study

Within the scope of writing this text, I had a wish to produce something of practical relevance to a work place. Consequently, I contacted the present company, and it turned out that one department was preparing for a major organisational change. What the manager initially formulated was an interest in focusing on how two groups could be integrated, mainly socially, as smoothly as possible. However, through discussions we agreed that the assignment would focus on the communication in an existing group. The focus was directed towards exploring how 'knowing' is maintained and shared in this complex work setting, in which the team members are invariably depending on each other. In addition, my aim is to discuss what it may imply to become a legitimate knower in that kind of setting.

The empirical field

The examined field in the empirical study is focussed on teamwork within a division at a major company. The team works with world wide computer support that is available 24 hours per day. Work normally consists of helping customers to solve problems. For this, knowledge of several computer systems and applications is needed as well as a good command of English, since it is the working language. As help in the support work there are routines in a database as well as personal experience within the group. The group's main focus is on the customers and the problem they need help with. This is also evident in that the team keeps the responsibility for the problem, 'the case', even if the group cannot solve the problem and has to send it to another department within the company. The team consists of a total of about fifteen persons, who work in shifts of between one and five persons on duty at a time. The support team works on a 'three-shift' basis, on a rotating schedule. Between the shifts there are a few minutes of overlap, where the most important issues for work continuation have to be 'transmitted' to the following shift. These phases of handing over ongoing activities to the next team are the focus of this empirical study.

Selection of situated work activities and data production

The shift changes were chosen as primary objects of observation, since they are core points of the day to obtain continuity in work and to help customers as rapidly as possible. Of the three shift changes every day, I concentrated on the ones in the morning and in the middle of the day, since several people worked on those shifts which made it possible to observe the interaction between team members. That would not have been possible during the night shift, nor at weekends, when normally only one person works. The shift changes consist of a twelve-minute overlap during which the leaving shift leader meets the starting shift leader to inform him or her about events from the shift. During those minutes, everything of importance from the previous shift has to be 'handed over' and explained. A meeting then follows this encounter during which the information is passed on from the shift leader to the persons working on the new shift.

Information to the participants and permission to video-record

Before starting the data production, I had met and talked to most of the team members. Management gave initial information to the participants, but this information did not reach everyone and as a result, information about the purpose of the study was given by me directly to the team members in connection with the initial observations. More information about the study and about me was also sent to the division in an electronic letter and published on the internal news site, which everyone reads at the beginning of the shift. Permission from the security department to video record was needed, and that took some time to obtain due to strict regulations and administrative routines. The manager had the contact with the department and kept me updated. With help from my supervisor, permission was finally granted. Just before starting the recordings, I attended a meeting where I orally presented the study, and where the participants had the opportunity to ask questions, which they did. All persons involved were also informed about their rights not to take part in the survey and the confidentiality surrounding the material. One participant later found the video-camera disturbing and was left out of the picture, but audio-recorded.

Observations

Initial observations of the work situation were made to get a general idea and understanding both of the actual work routines as well as of the group culture (Alvesson & Deetz, 2000). I followed work routines as how enquiries arrive, are handled and how the customer later is contacted. I also noted what artefacts were used. During the observations I had several conversations with the team members and they kindly helped me by explaining with what and how they were working. During the observations, notes were taken.

Video- and audio-recording

In order to analyse the complex situation a work place constitutes, there is need to play sequences of interactions over and over, and video- and audio-recordings give this possibility. This is an empirical method that enables analyses of the interaction between people and between them and objects in their surrounding. Activities that can be analysed are verbal communication, non-verbal communication, the use of artefacts and technologies, mapping of routines and problems in the situation as well as solutions to problems (Jordan & Henderson, 1995).

I chose to video-record since I, during the selected meetings, observed that the participants often referred to objects in their environment. The most important object was the shift report, on which the information at the shift changes is based. This paper document is often placed in front of the participants where they can see and read from it and use it as point of reference. The video-recordings thus help to explain what the participants refer to and talk about when that is not evident from the audio-recordings. The shift reports were also collected so as to make it possible to follow the quick changes between different subjects in the conversations.

The video- and audio-recordings were carried out in March 2003 and covered Thursday, Friday, and the following Monday to Friday. Fourteen shift changes between shift leaders were recorded, and thirteen between shift leaders and the team. One of the meetings between the shift leader and the team could not be recorded. The

length of the shift changes and the following information sharing varied between a few minutes up to nearly twelve minutes. The shift leaders changed between the recorded occasions, but the same persons appeared more than once on a few occasions.

Transcription of recordings[2]

In an initial phase, the audio-recordings were listened to several times and drafts of the excerpts were produced. These were then transcribed in more detail, and an overall analysis of the material was made. As a next step, I chose excerpts that would be analysed more closely and completed them. Non-verbal aspects important to the understanding of the speech were added based on the video-recordings. The transcription follows Linell's (1994) second level of detail in speech reproduction, where all words, hesitations and retakes are marked as they appear. Only longer pauses were marked. Normally, only capitals are used with proper nouns in this type of transcription, and abbreviations are avoided, but to clarify the participants' conversations abbreviations are used and marked with capitals. These abbreviations have been double checked with the shift reports. Changes of subjects were marked, since they change rapidly and often. Finally, the company and the team members were given other names so as to ensure them anonymity.

Analysis of interaction

In analyses of interaction and sense-making it is important to remember that language in itself does not carry any specific meaning; meaning is created in the dialogue between interlocutors in different situations. It is thus only with regard to the context that a full comprehension of a dialogue can be accomplished (Shotter & Gergen, 1994). Since individual sentences themselves carry no specific meaning, it is not the patterns of signs that are interesting but rather the use of words (Bakhtin, 1994; Shotter & Gergen, 1994) in specific contexts. The use of words is not static, in fact, it is constantly progressing, developing and changing in conversations and over time, which is also why it is problematic to talk about knowledge as static, as in cognitive psychology (Shotter, 1994).

Factors that play a role in the formation and use of utterances in conversation are based both on previous utterances as well as on anticipated responses (Bakhtin, 1994). However, there is one more part in the formation of utterances. Words and sentences have all been used in a living cultural context and are also used to make specific things happen in situated activity. This continuity is reflected in the future use of language in a specific practice. We are thus all dependent on the contexts at the same time as we are part of creating new and changed contexts (Linell, 1998b). Dialogue in itself does not have a beginning or an end (Shotter, 1994), so therefore, utterances rather than individual sentences should be the unit of analysis (Bakhtin, 1994). Since language and context are intertwined in these perspectives, phrases in dialogues cannot be taken out of and analysed separately from the context within which they were used (Shotter & Gergen, 1994).

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[2] For a full list of transcript symbols, see Appendix 1.

Highly co-ordinated communication is characterised by mutual orientation toward what are considered to be relevant actions, as well as topics and forms of talk (Mäkitalo, 2002). It is possible to recognise for an analyst through a continuous flow of speech without interruption or hesitation, co-construction of meaning, highly co-ordinated use of technological tools and specific language categories (Mäkitalo & Säljö, 2002). The analytical questions that have been guiding my analysis are the following:

-What kind of knowing is implied and taken for granted in talk and action?

-What kind of knowing is needed to bridge the gap between action and expectation in interaction?

This description of the empirical study will now be followed by the analysis of the generated data.

Analysis of the data from the empirical study

The two analytical questions above have formed the basis of the analysis and also serve as frame for the presentation of the data. Before examining these, a shorter description of the work environment is presented.

Accomplishing continuity: Shift changes in the daily work procedure

The support is, as mentioned earlier, organised in shift work. The schedule rotates in such a way that the combination of personnel is constantly changing. The role of shift leader is also on a rotating schedule. This means that the knowing needed for such a role is distributed between individual team members, even though it can vary since some individuals have responsibility over specific areas, and others are newer in the organisation. The shift leader's role during the shift is to take care of certain practical matters, such as distributing enquiries when needed and ensuring that there are enough people on the shift. Another important task for the shift leader is to compile a written report, the shift report, at the end of each shift. The report is a one and a half page template based on information from previous shifts, which is updated and completed. The shift report is organised under headings with specific reference to current information needed[3].

All the noteworthy aspects or cases from the shift that need further attention, or need to be known by more personnel, are noted in the report. It also contains internal information about the team, about sickness and other matters. It is the shift leader's responsibility to create this report, but since it includes the most important issues from the shift as a whole, the other team members participate indirectly in composing it. The team members decide if they have something that should be included and these members either give that information to the shift leader or the shift leader asks for it at the end of the shift. When finished, it is handed over to the next shift, as described earlier, and the work proceeds.

The enquiries, or cases, that constitute a large part of the work task, are normally some sort of problem that needs to be solved. The cases normally appear as requests on a number of web pages or over the telephone. The web pages thus need to be checked and monitored frequently. Either the personnel on the shift solve a case directly, followed by contact with the customer, or it is monitored during the shift. Since the main focus is to help the customer as quickly as possible, cases are passed on to the next shift if they have not been solved during the present shift. How the cases are solved, technically, depends on their nature. To give a full view is not possible, nor relevant here. Solving a case takes between a few minutes to several days, depending on the complexity of the problem, and whether or not it is of a routine character.

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[3] For an example of a shift report, see Appendix 2.

Knowing how to continue: producing continuity in work practices through interaction

From the empirical material it is clear that not all information in the shift changes is met with the same intensity in response. Some utterances are accepted as 'matters of fact', or routines, with a clear and undisputable meaning which do not require further, or only little, attention or clarification and are consequently not questioned nor asked to be explained. The messages of these statements are clear to the participants in the conversations. The following excerpt between two shift leaders points to this fact and shows that knowing and understanding is shared between them. In fact, LSL, the leaving shift leader, implies the kind of knowing that is taken for granted in the situation, and SSL, the starting shift leader, only requests a minor clarification. It is the leaving shift leader who is responsible of informing the starting shift leader and who is chairing the meeting[4].

Excerpt 1.

1. LSL: sen om det kommer in då...client already in use case så ska vi skicka casenumret till Nettan, å alla i CVSP[5] logglådan-
2. SSL: ((läser på skiftrapporten)) m ska te VCADS <u>GD</u>
3. LSL: <u>client</u> ID, in till VCADS GDlådan<u>...</u>
4. SSL: ((antecknar)) yes
5. LSL: ((//)) rutiner att approva
6. SSL: m
7. LSL: finns kvar ((//)) å sen UK... ((pekar på skiftrapporten)) de e skickat till Phil Haicox så för att testa om numret fungerar så <u>vi</u>
8. SSL: <u>m</u>
9. LSL: avvaktar svar... ((//)) ett waitcase som ni får ringa å kolla om de e okej de e internalserveranvändare bara
10. SSL: e de i Sverige eller?
11. LSL: i Sverige ja...
12. SSL: m

This excerpt contains four different issues[6] presented in only 48 seconds. The three first ones delivered by LSL are immediately confirmed by SSL (turns 2, 4, 6, 8). SSL also anticipates LSL's expected utterance on turn 2, as she reads from the shift report they both have in front of them. These facts show that SSL understands what LSL is talking about, and neither of them develops any further argumentation. The conversation runs smoothly without hesitation or meta-commentary; everything is said and accepted as statements of routine art. The fourth subject (turn 9) is met with a small request of clarification. This request is formulated as a suggestion by SSL "e de i Sverige eller?" (turn 10) that actually anticipates the answer given, which is then quickly confirmed with: "m" (12). In this way both participants co-construct meaning in the dialogue (Heath & Luff, 2000). The use of "bara" (turn 9) implies that LSL sees this as an issue of a routine art and expects SSL to know what is implied.

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[4] All excerpts are presented in Swedish since the nuances and exact ways of expression would not be possible to imitate in a translation of the material.
[5] Abbreviations are widely occurring. They are names of different applications, servers or other tools.
[6] '((//))' indicates the beginning of a new issue.

Resources used to accomplish co-ordinated routine activity: people, technology and language

Different resources are continuously used and referred to in the shift changes, and it is important that all team members have access to and are familiar with these to create a common base of understanding from which a mutually intelligible dialogue can take place (Hutchins & Klausen, 1998; Suchman, 1997). Team members have to know about these resources as well as what they imply and when and how to use them. In other words, it is important to know what is important to know.

The undisputable main resource in the study is the computer. The team members use it as a physical tool to solve problems, but it also contains plenty of relevant information. At the shift changes, certain 'web pages' are referred to in speech, and the participants also turn away from the shift report towards the screen and use that as a point of common reference. Beside the computer, people, both in the group as well as outside, are referred to by name or as personnel in other departments. On a few occasions, other people in the room, or other participants in the shift meeting (beside the shift leader from the ending shift), are used in the conversation to clarify issues when those individuals possess additional information, and this is acknowledged by the participants in the shift meeting. In this way, the team members clearly use each other as sources of knowing to help solving or explaining matters (Gergen, 1985), when the access to information has not been available to everyone. The team co-operates with people in other departments who are commonly referred to and used as resources. The following example shows how people in another department are used as a resource. When the normal work routine is broken it becomes evident that this resource is important.

Excerpt 2.

1. LSL: Stellan, VISSUP, borta resten av veckan, om vi lägger över case till dom så vill han dock att vi ska ringa Ola Mickelson på telefonnummer bla:...va observant på ifall han plockar upp dom för att ja gjorde de nu här vid tvåtiden å så ringde ja Ola...å han lät *väl*digt frågande å så sa ja det att jo men Stellan ringde mig i morse, å bad mig göra såhär om vi la över nåra case på VISSUP ((föreställer Ola Mickelsons röst[7])) "jahaa?"...a vill *du* att vi ska göra så ((ohörbart))? "ja det får vi nog göra för jag får inte upp nånting i TIE"...
2. SSL: ((ironiskt)) å va käckt
3. LSL: "ja okej" sa ja "vet du hur vi brukar göra då när vi skriver 'Gruppen' å VISSUP?" å han bara "nääää"...<u>nä vi</u>
4. SSL: <u>ah men</u> ursäkta jag <u>begår harakiri-</u>
5. LSL: <u>så Stellan</u> Stellan har inte sagt nånting till <u>honon</u>
6. SSL: ((irriterat)) <u>ja</u> men de här e ju egent-
7. LSL: *där*utav, var observant på ifall han plockar upp dom eller inte för vi vet inte om han har fattat eller...gör rätt eller vad han nu gör

---

[7] Inverted commas signal that Ola Mickelsons voice is animated.

17

In this conversation, a person (Stellan) is referred to by LSL, and precisely which person this is, is specified by LSL by adding the technical content of work of the department where Stellan is working (VISSUP). This is but one among the many ways in which a technical term (the name of an application) can be used in order to achieve clarity and precision in talk. That neither Stellan nor VISSUP is explained further shows that the notion is taken for granted. Stellan is thus referred to as belonging to another team, and this is evident to LSL. The way Stellan is referred to, only by first name, shows that Stellan is an established and well known resource. As LSL reports on what is new, he thus makes clear that Stellan currently is not available as a resource, but is occasionally replaced by a person named Ola, who is accordingly not as familiar to them and hence presented by full name. But it is clear to both parties what is meant by what is said and what they are supposed to do. The information is first given by LSL that Stellan is not available at the moment. This is then followed by further information, which is not on the shift report, to ascertain a greater understanding of what it implies. When Stellan is absent the normal work routines are no longer applicable "om vi lägger över case till dom så vill han [Stellan] dock att vi ska ringa Ola Mickelson" (1). It is here the clarification is extended to involve also a break in this routine when it appears that Ola not is aware of his role as stand in, and that he is unaware of the way Stellan works and what kind of support is needed. This causes both ironical as well as irritated utterances (turns 2, 4 and 6) while at the same time the participants deal with the situation to re-establish some sort of order (Suchman, 1997). It becomes evident that Stellan not is a resource that can be replaced by just anyone.

As mentioned earlier the shift report is a main resource and a focal point of reference used during the shift changes. This technology is used as an artefact that mediates the collective knowing achieved during earlier shifts. When comparing the oral accounts in participants' conversations with the written shift report, there is a remarkable coherence in linguistic style. Compare this excerpt with the text from the shift report.

Excerpt 3.

> SSL: om det kommer mail angående 'Gruppens' åtkomst till IMservrarna på Moderbolagets Xnät...skicka denna info till...Nettan Övik och Rune...de e de att vi ska kunna köra test com genom VIFT Warleyservrarna...om de e nåt som e oklart så kan ni kontakta Nettan Övik...
>
> har en case från Nederländerna ska vi kontakta action engineer å...fråga om vi kan skicka rätt FIDnummer till...Joss...samt ska vi veta vilken, vilken som gäller för XC nitti...

The text in the shift report:

```
Om det kommer mail angående 'Gruppens' åtkomst
till IM-servrar på Moderbolagets X-net...skicka
denna info till Nettan Ö & Rune. Det gäller för
att vi skall kunna köra test com genom VIFT
```

```
Warley servrarna. Hör med Nettan Ö om något är
oklart.

Ring Action Engineers och be dem om vi får lov
att leverera korrekt FID till Jos, samt vilken
som gäller för XC90.
```

The structure of the phrases is remarkably similar. Compare for example the first phrases of the examples: the utterance from the excerpt "om det kommer mail angående 'Gruppens' åtkomst till IMservrarna på Moderbolagets Xnät...skicka denna info till...Nettan Övik och Rune" is analogous with the written text on the report "Om det kommer mail angående 'Gruppens' åtkomst till IM-servrar på Moderbolaget X-net...skicka denna info till Nettan Ö & Rune". The intonation in the excerpt is also not as free as it normally is in free conversations. Hesitations and pauses occur but they correspond to a large extent with full stops and commas, which normally do not exist in normal conversations. By reading from the report the shift leader makes public what has been noted as relevant and important (Hutchins & Klausen, 1998; Hutchins, 1996); and the lack of elaboration about the issues in the report points to the high co-ordination in the team in terms of what is of relevance as well as how it is expressed. However, the possibility of questioning both the content and the ways of expressing it, is possible with the report as point of reference. The written report, hence, works as a support in the conversation and also as a medium of collective remembering, that maintains the system as a whole (Hutchins & Klausen, 1998). The frequent use of formulations from the report shows how members rely on this technology and how efficient a tool it is in handing over tasks in just a few minutes.

One resource that has not been specifically mentioned so far is language. Interaction between people and resources is mainly mediated and co-ordinated through language, and language additionally serves to mediate information. The specific categories in talk used to co-ordinate people's actions and make it possible for them to proceed with their work are mostly taken for granted and seen as naturally occurring in the study. Technical categories are commonly used in the current setting, but in a number of different ways. Technical language mixed with very local and specific ways of talking is also important as a means to unify the group. These functions of language use will be examined in the following section.

As is the case with technical terms, there are both terms that are used and known internationally in information technology as well as ones that represent local jargon. In the more widely known terms, a lot of knowing is taken for granted that can be understood, at least partly, also by people outside the group. But, since the conversations also are full of technical terms specific to the team and the local practice, knowledge about terms of the first type is not enough to decode the full meaning in group-specific talk. This implies that knowing at a general level is not enough for successful participation. Rather, it has to be complemented by knowing how to use the terms in *that* specific context (Gergen, 1985). To understand the meaning of general terms can help in learning how to use them in specific milieus but is not sufficient. Language in this way works to constitute groups as groups (Edwards, 1997; Gergen, 1985), but meaning is at the same time to a large extent restricted to those 'within'.

In the following example, it becomes visible that it is taken for granted that colleagues are accustomed with most of the specific ways of expressing themselves as well as what the expressions themselves signify, both technical as well as more general ones. Consequently, no further explanation to reach a common understanding is normally needed. In this excerpt the starting shift leader (SSL) informs a shift member (S) of important issues from the previous shift.

Excerpt 4.

1. SSL: ((//)) ä:: det ligger rutiner i GDID tror jag, som ska approvas ((//)) och sen så har det kommit nya telefonnummer men dom tar natten...((//)) ä: Jonny Ericsson ska vi ringa å höra status, de e ett gammalt case...ä:: datumen i caset konstiga läs det noga har Hans skrivit så ja vet inte riktigt vad det beror på, men i och med att det här är USA så får vi ta det här ikväll
2. S: m
3. SSL: vi får ringa å kolla han lite senare ((//)) och sen på sönda den tjugotredje har vi meintenans på Orapp sex...påverkar Impact och eu:: och eu: eventuellt GCC......
4. S: GCC?
5. SSL: m snurrar också där

This excerpt is full of technical terms. In "rutiner…ska approvas" (turn 1) it is clear to both participants what routines they are talking about and how and why they should be approved. The same is valid in turn 3 for the statement "meintenans på Orapp sex...påverkar Impact och eu:: och eu: eventuellt GCC" where maintenance means one specific thing to the participants. What is meant by "GCC" is left implicit. SSL first hesitates when saying that it may have an impact on "GCC" and S responds with a confirming question. The way the technical term "GCC" is used, clearly makes sense and implies something of importance to the participants. They can use their knowing and respond in expected ways to the preceding statements in the conversation.

In the group's vocabulary there are many English words pronounced in Swedish, for example "approvas" och "meintenans". This probably is caused by the fact that English is the language normally used within information and computer technology as well as in the contact with foreign customers, hence it is the adopted way of expressing oneself in this group (Bakhtin, 1994; Gergen, 1985). The use of different abbreviations is also one sort of technical terms within the group as mentioned above. As tools in this environment, the usage is local and specific. To the members of the team they imply many different things, and what is in focus depends on in which circumstance they appear. Another type of local jargon is more general expressions used in this context with specific meanings. Examples of this jargon are "kommit nya telefonnummer" (turn 1), "ringa å höra status" (turn 1) and "snurrar också där" (turn 5). Other examples can be found in excerpt two, turn 1: "lägger över", "plockar upp", "får inte upp nånting". Statements like these could mean just about anything in general. But, in this specific setting the utterances refer to specific actions to be taken in relation to the computer system. To the team members the statements do not only imply that information is presented per se, but also what needs to be done and what the consequences are, and the expressions thus serve as a systematic way to mediate

meaning (Gergen, 1985). All of these different categories have to be learned from within the situation in which access to information is as unrestricted as possible (Heath & Luff, 2000; Hutchins, 1996).

To sum up, the resources used in this particular work setting are tightly intertwined and interact together with the personnel in the setting to accomplish work. Very specific verbal expressions play a large role. The meaning of an utterance only needs to be alluded to to be understood as members use very specific ways of talking (Hutchins & Klausen, 1998). To an outsider it is impossible to understand the meaning of most utterances in this setting and even harder to realise the consequences of what is said (which is also a common problem for a newcomer at a worksite). However, 'from within' this working team, this kind of talk is highly efficient and absolutely necessary as a tool for the task of handing over cases and problems to be solved in the continuation of daily activities during a very short time period of a few minutes.

In this first part of the analysis, the dialogue in the excerpts has been of a kind where consensus has been prevailing and what has been said has not produced discussions. In the next part this changes to situations where there are disruptions in talk creating gaps that need to be bridged in order to continue with the ongoing activity.

Dealing with disruptions in talk: negotiating the character and relevance of problems

Within the routine information given during the shift changes, there are sometimes disruptions in talk where issues need to be accounted for, elaborated upon and discussed. In the following excerpts the character and relevance of problems are negotiated. The conversations aim either at finding a solution or establishing some sort of new common platform from where the group can get on with the job. To illuminate how such issues are negotiated and resolved is the aim of the second analytical question.

Co-constructing the character of a problem

This sequence shows how the group involved in routine information suddenly comes to discuss what the possible cause might be of a problem, if it is of a specific and isolated nature, or if it is to be understood as an indication of a more general problem. In this conversation the starting shift leader (SSL) gives information to two shift members (S1 and S2).

Excerpt 5.

1. SSL: ((//)) På TSC meinsajt, error kods där man letar efter error kods på VCADS Pro, den funka inte… ee TSC e informerad, å hoppas den kommer upp ida…((//)) finns rutiner att approva under GDID…((//)) vi har nya telefonnummer, från u-net ska testas, alltså dom flesta e testade, de e bara en grej som har nationwidenumret i England ska bytas ut…å jag har skickat en request till Phil Haicox, så ska han testa den, å återkomma…å de e lite risk att bara stoppa in <u>den</u>

2. S1:   <u>ja nej</u> när alla ska
       köra på de
3. SSL: ja precis
4. S1:   de e bättre att alla ((ohörbart))
5. SSL: ja..ja…((//)) eu::…SOStvåan, den servern som PVT går på, när dom tar
       remote, den e kass, den tappar kontakten efter tjugo:: minuter
       halvtimme, <u>så</u>
6. S2:   <u>eeh ja</u> tänkte på de att de kanske e samma på SOSettan för
       Engström kan ju inte, eller, Nora kan ju inte vara inne mer än så länge
       med
7. SSL: nä de e- jag tror de e våra globala Nora har problem med det, så ja vet
       inte varför de e lite…
8. S2:   för <u>när ja tänker ja</u>
9. S1:   <u>dom har ju inte gjort</u> nån remote på
10. SSL: a
11. S1:   <u>två veckor så tror ja</u>
12. S2:   <u>dom senaste remotarna</u> har ju också tappat efter ett…inte sådär
       jättelång tid asså…
13. SSL: <u>ja kanske</u>
14. S1:   <u>behövde se</u> över allihopa
15. SSL: om du får tillfälle idag så då kan du prata med nån som
16. S2:   varför sa ja så?
17.   ((skratt))
18. SSL: de va tills Ramon- man vågar inte prata om nåt ((ohörbart))
19. S1:   <u>nä precis</u>
20. SSL: <u>fixarna</u>
21.   ((skratt))
22. S1:   då får man med en gång göra det
23   ((skratt))
24. SSL: eh…ja den ligger på NTSB
25. S2:   okej

At the beginning of this excerpt the interlocutors are highly co-ordinated in terms of the content and meaning of talk (turns 1 to 5). After this, S2 suggests (turn 6) that the problem just presented might be of a more general nature "ja tänkte på de att de kanske e samma på SOSettan för…", than indicated by SSL in the first place. This suggestion is achieved through reference to a similar problem (för Engström kan ju inte, eller, Nora kan ju inte vara inne mer än så länge med), implying that they both might be indicators of a common, more generic problem. SSL, however is not convinced that that is the case and delivers another explanation to the second problem referred to by S2 when implying that it is another type of problem: "nä de e- jag tror de e våra globala Nora har problem med" (7). After a moment's pause, S2 and S1 simultaneously start to argue (turns 8 and 9) instead of giving consent to SSL's utterance. What S1 utters is an indication that this may not be a problem (if they just did a remote), which S2 picks up (turn 12) and says that surely that is no solution to the problem (also after the last remotes the problem has persisted). What he implies then is that there really is a problem. The first consent of there being a problem comes in turn 13 "ja kanske". A general idea of what to do to establish the system is also delivered "behövde se över allihopa" (turn 14). The consequence of this suggestion is finally established in turn 15, where SSL finally agrees that this should be looked into

more closely, and the task of doing this is directed towards S2 (om du får tillfälle idag så då kan du prata med nån) who started to problematize the issue.

What then follows (turns 16 to 23) is an implication of the consequences of pointing to a problem in this specific work setting. In the local culture 'pointing to a problem' always implies a risk of coming to 'own' that problem, and consequently takeoff tailing responsibility for solving or investigating it. The laughter (turn 17) is thus directed towards the implications of S2 having started the discussion. The subsequent contributions to the discussion imply that new work tasks always come into being through talk; through naming it and pointing to it as a problem. One thus has to be careful to avoid becoming the person who "fixes everything". S2 has to take on the responsibility SSL gives when putting S2 in charge of the problem (om du får tillfälle idag så då kan du prata med nån). Since S2 was able to detect the problem, it implies that S2 is also competent of handling it. The agreement is reached through joint collaboration from the participants. They all contribute with what they know and together they argue and value their collective knowing to find a solution (Hutchins & Klausen, 1998).

Negotiating the relevance of a problem

The following excerpt is illuminating in several ways. Firstly, it shows that in order to have a productive communication, the participants need a common base of understanding. Secondly, questioning how a problem is presented by a member, implies questioning that member as a legitimate knower. It is important to both the participants to be acknowledged as competent. Thirdly, in discussing a 'problem', the members need to be co-ordinated in terms of its relevance, otherwise they need to establish *to whom* it is a problem: to the team or to someone else. These last two aspects appear parallel and are visible in relation to each other.

Excerpt 6.

1. SSL: ((pekar på skiftrapporten)) de kan vi bortse från för det har vi löst ECSlösenordet, som dom hade problem med under förmiddagen
2.   S: okej
3. SSL: ja och vi inväntar svar från Rickard San ääh nej Niklas <u>heter han, Vadelin</u>
4.   S: <u>va var det för problem</u> då ja jobbade inte igår.
5. SSL: pro- nä det var inget problem, problemet va att
6.   S: ((skratt))
7. SSL: när dom hade bytt lösenord, så får dom upp error this eh:: this userID can not view requested page
8.   S: så du menar de e inget problem
9. SSL: nä…vet du varför?
10.   S: nää
11. SSL: om du byter ett ECSlösenord det är bara för att han ska att komma in på tredje vägen, men sidan
12.   S: man ska väl inte få ett sånt <u>meddelande</u>?
13. SSL: <u>jo</u> för s*id*an rotas vidare in i Företaget AB:s nätverk, han har inga rättigheter i Företaget AB:s nätverk…alltså har användarIDet inga rättigheter…

23

14.	S:	alltså är det ju fel någonstans
15.	SSL:	alltså är det fel felmeddelande eller så är det så <u>att han rotar</u> vidare-
16.	S:	((<u>skratt</u>))
		det är ju det jag <u>säger</u>
17.	SSL:	<u>ja, ja</u>...men de e ju asså det funkar ju för en
		internanvändare går *du* in och ändrar då ramlar du tillbaks med ditt
		men han är ju extern han är ju konsult jobbar för semcon eller vem det
		nu va, *där*av orsak...((//)) dom ska göra en remote inatt på en
		Indonesisk PC
18.	S:	okej
19.	SSL:	((//)) äh:: de här…måste du bringa reda i asså för jag har ingen aning
		om detta, om det <u>kommer mail angående</u>
20.	S:	((//)) <u>va e ED</u> för nånting? ((S läser och
		pekar på skiftrapporten och bryter in))
21.	SSL:	ja det ska va Indonesien så det är nog ID, troligtvis
22.	S:	ja okej
23.	SSL:	ja ska ändra det, ((//)) ((tillbaka till ämnet som avbröts)) om det
		kommer ett mail angående 'Gruppens' åtkomst till IMservrarna på
		Moderbolagets Xnät, så e det för att vi ska kunna köra testcom inom
		VIFT Warleyservrarna, hör med Nettan om något ä oklart, <u>förstår</u> du?
24.	S:	<u>okej</u>
25.	SSL:	((SSL tittar på S som tittar och läser på skiftrapporten))... ...hä,
		välkommen till klubben, så det ska asså
26.	S:	((skratt))
27.	SSL:	vi måste ha ett dokument för när- dom kanske bara ringer och säger
		hejsan hoppsan lingonskogen, fixa detta! <u>va</u>
28.	S:	<u>det</u> trodde jag att dom skulle
		fixa själva…där på, i Warley
29.	SSL:	ja
30.	S:	men jaja men om vi ska gör <u>det så</u>
31.	SSL:	<u>men</u> hela det här projektet ä väldigt
		upplyst i dunkel så att ja måste säga jag förstår inte speciellt mycket av
		det hela, köra *test*com jaja men hallå…va::?
32.	S:	nej, inte ja heller
33.	SSL:	va e <u>IPadresser</u>
34.	S:	<u>ja precis</u>
35.	SSL:	å hela biten va? ja vet ingenting
36.	S:	ja visste inte ens att vi skulle göra det
37.	SSL:	nä…

This conversation starts in a routine manner, which is disrupted through a request of clarification from S (turn 4). S makes clear that she does not have enough information to follow SSL:s mode of reasoning and thus points to a gap that needs to be bridged before they can continue an intelligible conversation. SSL has started on a different level of knowing, that S has not yet attained. SSL then starts to answer ambiguously that the problem really was not a problem (turn 5), but then clarifies that the customer had received a notification of an error on a web page. S then questions that this is not regarded as a problem (turn 8). This shows that S and SSL have now established a platform common enough for the conversation to continue. However, it also implies that S challenges the position of SSL as the one who knows (så du menar de e inget

problem). SSL thus needs to account for his statement, and he responds to this by signalling that 'I am the legitimate knower' who is willing to share that knowledge with S (turn 9). To move ahead, it becomes clear that the two participants have different views on what the problem is, or rather, their focuses are different. S focuses on the problem from the point of view of the customer and the group's task of providing services ("man ska väl inte få ett sånt meddelande?")(6), whereas SSL sees no problem in the computer system (turns 13 and 15) and therefore does not regard it as the group's problem. The importance of being acknowledged as competent is visible in turn 17 where SSL agrees only quickly to S's argumentation, and then moves on and delivers an alternative clarification. SSL positions himself as in need of S's competence as he turns to a problem in the shift report (turn 19). This creates a new communicative platform from which they both can continue as 'competent colleagues'. He then reads from the shift report and implies that information is somehow problematic through the question "förstår du?" (23). In this manner he invites S to join in his 'troubles talk' where focus is directed towards the relevancy of this problem.

SSL thus counts on getting S on the same line as he, to question the issue as such (turns 25 and 27), but once again it shall become clear that the participants argue for different things. Instead of answering on SSL's utterance (turn 27), S accepts it as the team's problem: "men jaja men om vi ska gör det så". SSL on the other hand does not take that premise and opposes himself to it (turn 31), and with this new argument S agrees with SSL that neither of them see the point with the task in the shift report (turns 31 and 32).

The last part (turns 23 to 37) is also an example of how the team members negotiate their roles, both as individuals and as a collective, and what their main tasks should be. Here, the documentation is a way of escaping from personally getting into the position of being the one who 'fixes' things (turn 27), which can also be compared with excerpt five, turns 16 to 23.

To summarise, the meaning taken for granted at the shift changes is highly connected with the group's knowing of its situation, as well as with what is regarded as being within the group's work engagement. The language shows adopted ways of expressing oneself that are specific to the context and the available resources, and which includes a lot of knowing. Group specific language, the shift report, and other personnel are resources on which the team relies for work accomplishment and these are found to be important.

> "One demonstrates understanding in a relationship not by grasping
> what is in the other's 'mind' but in one's response to the other's
> actions" (Shotter and Gergen, 1994, pp. 21-22).

Discussion

Even though the work setting is characterised by a complexity of interacting people, tools and technologies, it is possible to point to certain aspects of the work situation that are important for work continuation and achievement.

The use of language is highly specific to the context, and it embodies implicit meaning and knowing that render effective action possible. Aspects of language use that have been emphasised are:

- The use of a technical language with fairly standardised meanings
- The use of technical terms in specific ways that represent adaptations to local needs and priorities
- The use of everyday language in a specific, technical manner to clarify certain routines or ways of handling work

These resources are used as means to effectively accomplish work, to clarify relations among the staff and to unify the team. At the shift changes information can effectively and concisely be spread between colleagues since the information itself and what it implies in terms of actions only need to be alluded to in this mode of talking. For the co-ordination of perspectives to be achieved, it is important that all members of the team have sufficient information and that they have acquired common frames of knowing. Otherwise, further detailed explaining is needed which consequently slows down the work procedure. With common frames of knowing, it is possible for the team members to use highly indexical words and categories when mediating complex information to experienced colleagues.

When referring to other resources, for example texts, knowing of what they imply is also to a large extent taken for granted. The shift report is used as a remembering device, but in order for it to work as a concise and efficient technology, the team members have to rely on that the knowing in the group is transformed into text at a level where the implied action is evident to the reader. Additionally, the information has to be formulated exact and precise as well as containing the relevant information. That the shift report works in this way is supported by the fact that the conversations take place without interruptions for additional explanations. That the written text is precise and well formulated, and in most cases sufficient, is shown when the shift leaders read from the report when 'handing over' the information. When a system like this works, it forms a good basis for achieving continuity in activities. That more people are competent to react in situations and detect errors also makes the system less vulnerable to ruptures in activity.

There is a paradox about settings like this one, where an intersubjective understanding makes work efficient but where, at the same time, that specific and local knowing is hard for an outsider to access. To become a legitimate knower, it is important that the team members are aware of this complexity of their language use so as to help new members. However, it is also necessary for new members to actively participate in team activity and to learn the language 'from within', as well as how tools and technologies are used. A general technological knowledge can help in this procedure, but is far from sufficient. The shift changes show the complex nature of language use,

and since they are core points of the day where the effectiveness of the communication system is in focus they can hint at what needs to be learned in order to properly account for the situation. To physically be near the team while working and during the shift changes, but not actively taking part could possibly render the situation more visible to the observers, even if they are occupied with other tasks.

Teams adopt a jargon to maintain the work culture and the identity of the group. Through jokes, short 'stories', and other internal ways of expressing themselves, group cohesion is maintained. It is vital in the difficult balancing of being "professional experts" maintaining integrity and being "service minded" and always meeting the customers' needs. This jargon is a consequence of requirements that sometimes are conflicting, and functions as a regulating device in keeping the team together as a social unit. As a consequence, group specific language stabilises the group clearly making visible to others who they are and what they do. However, there is an indication that the perspectives on how to work with a task sometimes varies between being service minded and sustaining oneself as an expert. These alternative perspectives are not of the kind 'either-or' but rather on a continuum and they sometimes produce discussions, which are visible as interruptions in the information flow during the shift changes. Of course, both perspectives need to be taken into account in this kind of support work. A customer orientation is also visible in that responsibility of helping the customer is kept even if a request is sent off to another department, but these are only two factors in play. How problems and cases that the team receive are valued and defined thus depend on which perspective is taken.

Without shared knowing, continual and efficient activity would not be possible. That modern work settings are complex and thus rely on an effective communication is suggested by the findings in the empirical study. The knowing referred to in this study implies a mixture of different competencies as: speaking, reading, writing, seeing, acting, reasoning, and evaluating. These correspond well with Shotter and Gergen's (1994) description of what the term can imply. Knowing is also theoretically perceived by the same authors as a way of understanding what constitute the boundaries of the group and what the work tasks should or should not be. However, it is the usage aspect of the term that is in focus and knowing thus has to be understood as being able to act in line with local traditions and to communicate in task related situations.

Methodical experiences

The strength with the empirical study of IT-support practices is that it has been carried out in an authentic setting. The recorded events occur as part of a daily routine also when the researcher is not present and thus shows a naturally occurring event. Also, since video- and audio-recordings have been the method of producing data, this material is not of second hand reporting. These recordings catch relatively closely that which is in focus and studies show that the presence of such recording techniques is soon forgotten (see for example Jordan & Henderson, 1995). Another feature that speaks in favour of the selected object of analysis, is that the continuity in the work process is dependent on these events and even though a study was carried out the information sharing had to continue, to avoid confusion or disruption. My presence as researcher was of course acknowledged and even though such recordings are always products of the whole situation, it should not have had a greater impact on the quality

of the data. In terms of the more basic interactional patterns, this material could also have relevance for the understanding of other similar settings in which team collaboration is a salient feature of the work carried out. However, more close up interactional studies of how continuity is achieved in such settings are important to draw any further conclusions.

Acknowledgements

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Appendix 1: Transcript symbols

(( ))   Transcriber's commentaries on: inaudibility, non-verbal aspects, characterisations of how talk was delivered, extra discursive activities
((//))   Change of subject in the conversation
…   Untimed longer paus
__   (Underlined) Simultaneous utterances
,   Continuing intonation
?   Question intonation
!   Exclamation intonation
:   Prolonged sound
-    Cut-off sound, interruption
Italics   Emphasised word or syllable
*   *   Said with laughter in voice
" "   Imitation of another voice

Appendix 2: Example of a shift report

Subject:

```
==================================================================================
      Skiftrapport        Rubriker och avgränsare skrivs i blått, övrig information i svart. I varje rubrik står vad som skall skrivas var.
==================================================================================
Pass:
Skiftledare:
Övriga:
==================================================================================
Under passet:        Information om det som har hänt under passet
==================================================================================


==================================================================================
Info från tidigare pass:    Information som är viktig från tidigare pass. Skriv med från vilket pass det kommer ifrån. Ex. (020612 D) Nnnn Xxx
==================================================================================



==================================================================================
      Internt:         Temporär intern information ex. om någon är sjuk.

==================================================================================
```

--Klockorna är på gång att stanna (Los Angeles o Buenos Aires döda, Dubai på G). Batteri byte samt synkning
önskas.,   -(Kanske vore en bra ide att få hit någon som kan fixa detta???)   -Kolla m Antii om de hinner
byta. (Kontakta EJ   jag har pratat m honom redan och det gav inget förutom irritation!

```
==================================================================================
Major cases:         De major case som ligger ex. mot B-O som behöver bevakas
==================================================================================


==================================================================================
Att göra:             Info + uppgifter att göra när tid finnes, typ helg/natt jobb Viktigt att göra i rött
==================================================================================
```
   VLC:

   GCC:
   =======

   VADIS:
   =======
   --   Om det kommer mail angående   åtkomst till IM-servrar på Ford X-Net....skicka denna info till
            Det gäller för att vi skall kunna köra test com genom VIFT Warley servrarna. Hör med
   om något är oklart /
   --   Ring Action Engineers och be dem om vi får lov att leverera korrekt FID till Jos, samt
vilken som gäller för XC90.

   IMPACT:
   =======

   VCADS:
   =======
   -- TSC Mainsite (errorcodes) funkar inte sedan underhållet. Beräknar vara alive igen i morgon.
   GDID:

   --Rutiner att approva
   --Ny Telefon nummer, finns i skiftmappen. ligger också i important foldern --\ Man kan uppdatera direkt i
   den/   Fungerar ej Sydamerikas nummer, lägg in dem ändå. /
   .   BR Ett nr skall testas igen.
   -            CO Ett nr skall testas iger
   --   PH GDID testa n
   --.   PL GDID testa nr,

1

33

UK GDID testa nr. Nationwide så det påverkar alla user i UK. Be anv testa det nya numret innan vi
flyttar över alla anv. Kanske   kan köra ett script då för att flytta över alla anv då det förmodligen är väldigt
många/   Skickat mail till   för att testa om numbert fungerar

ECS:
=======

ÖVRIGT:
=======
-            Ett ärende är lagt till NTSB teamet angående problemet med SOS2:an som tappar uppkopplingen
efter en stund.
===

Case/Reports som skall åtgärdas efter genomgång av wait case/reports *Case där kund skall ringas, skriv med landskod*
===

===
Case/reports som behöver bevakning   *Case som har legat för länge mot B-O och där B-O skall kontaktas*
===

===
Maintenance   *En kort sammanfattning av kommande underhåll, utförlig info finns i skiftmappen*
===
--Sön 23/ kl 17:00-21:00 Maintenance on orap6 Sunday 23 of March Hi, we would like to take down all the 8.1.7
databases on orap6 next Sunday 23 of March during the maintenance window 17:00 to 21:00 Swedich time. The
reason for this is a patch that we have to put on all the 8.1.7 databases. We hope this is OK for you, if not please
come back to us as soon as possible.Regards,   **Impact är**
broadcastat.   Svar från Camilla gällande hur detta påverkar GCC /   GCC skall inte påverkas.
Camillas svar finns i Maintenance mappen
===
Arbetstryck: *Hur upplevde du "trycket" på skiftet...lagom, mycket, lite.....?!?*
===
--Lagom